



RESEARCH ARTICLE

MARJAN (CORALLIUM RUBRUM) ANIMAL ORIGIN DRUG BIOLOGICAL DESCRIPTION AND PHARMACOLOGICAL PROPERTIES; A REVIEW STUDY

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ABSTRACT

Marjan (Corallium rubrum) belongs to phylum Cnidarians & family Coralliidae. *Marjanis* animal origin drug, its two types 'Beekh-e-Marjan' or 'Busud' (Root of coral) and *Shakh-e-Marjan* (Branch of coral), *Marjan* contains around 85% of the wet weight of calcium carbonate in the form of calcite and 5% other elements such as Mg, Fe, SO₄, P₂O₅, SiO₂, Pb, Zn, and an organic matrix. Its therapeutic uses in astringent, styptic, antidiarrheal, diuretic, antiseptic, detoxificant and tonic for the heart and brain, it is useful in melancholia, epilepsy, insanity, palpitation, enlargement of spleen, gastric disorder renal calculi and piles. Administration with egg yolk gum acacia and catechu is recommended in stomatitis, haemoptysis, cough, phthisis and asthma. Its use has also been mentioned in impotence, spermatorrhoea, gleet, gonorrhoea, carbuncles, scrofulous affections, tuberculosis, diabetes, and general debilities. Pharmacological study of *Marjan* (Corallium rubrum) likes, Antibacterial activity, Anti-osteoporotic activity, Anti-atherosclerotic activity, Haemostatic activity, Hepato-protective activity, Anti-hyperacidity activity

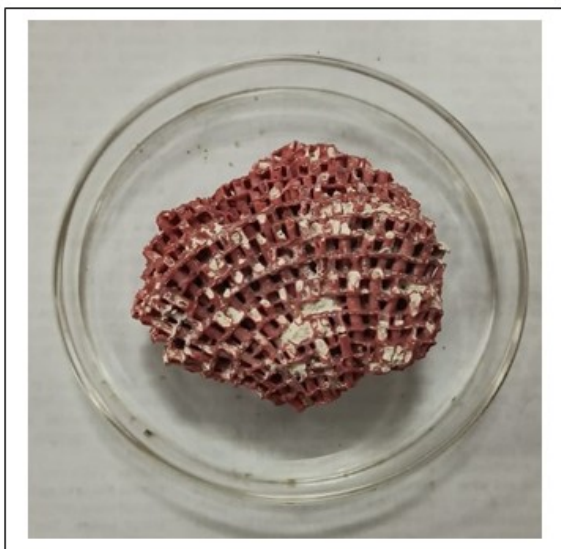
INTRODUCTION

Marjan is marine invertebrate of the phylum Cnidaria, class Anthozoa which form compact colonies made of genetically identical individual polyps. Several species, mainly belonging to the subclass Hexacorallia, form hard calcium carbonate (CaCO₃) skeletons which are the main constituents of the tropical coral reefs. The skeletons often present complex morphologies which give three dimensional complexities to the substratum and serve as a refuge for several species, increasing biodiversity and contributing to shape marine seascapes¹. In the subclass of Octocorallia, a group of species belonging to the family of Corallidae (to which the majority of the so called precious corals belong) produce hard CaCO₃skeletons which are used as raw material for jewellery.² Corals are small sedentary marine animals that occur in dense colonies in warm shallow water of the oceans. Coral reefs are referred as "Tropical rain forest of the deep", since they are the most diverse, productive, beautiful marine organism providing valuable scientific insights into the nature of underwater ecology³. *Marjan* is mentioned more than once in Al-Quran. Text: 'From both of the ocean, emerge luloo (pearl) and *Marjan* (coral)' (Al-Quran, 55:22)⁴In Unani classical literature, 'Beekh-e-Marjan' or 'Busud' (Root of coral) and *Shakh-e-Marjan* (Branch of coral) are used separately for different medicinal properties. Some authors however are of the view that the so called root of coral is not a drug of animal origin and mentioned it under mineral origin drugs. It is also known as *Busud* or *Marjan* and is

comprehensively described in Unani literature. It appears like the honey comb but the pores are large. The *Busud* is soft when remains in water but becomes hard after removing out. There are different types of *Busud* which have been classified according to colour namely white, red and black. The white are soft which and slightly harder, black one is bad in quality. Then red and the black are very hard, black is considered bad in quality. The best quality *Bussudis* red, which is clear with no earthy matter, its ash is used as tooth powder for strengthening of gums and teeth. It also used as '*Kuhl/Surma*' for the treatment of eye diseases. If mixed with appropriate oil it is used as ear drop. As an aqueous lotion it is useful in leprosy. Internally it is astringent, styptic, antidiarrheal, diuretic, antiseptic, detoxificant and tonic for the heart and brain. It is useful in melancholia, epilepsy, insanity, palpitation, enlargement of spleen, gastric disorder renal calculi and piles. Administration with egg yolk gum acacia and catechu is recommended in stomatitis, haemoptysis, cough, phthisis and asthma. Its use has also been mentioned in impotence, spermatorrhoea, gleet, gonorrhoea, carbuncles, scrofulous affections, tuberculosis, diabetes, and general debilities^{5,6}.

GEOGRAPHICAL DISTRIBUTION

Marjan is found in Red sea, Persian sea, Arabian Gulf, Mediterranean Sea, and Atlantic Ocean⁹ it is found in India Maldives, Lakshadweep and Rameshwaram⁷.



Western and Eastern Mediterranean: from Greece and Tunisia to the Straits of Gibraltar including Corsica, Sardinia and Sicily. Eastern Atlantic: South Portugal, Morocco, Canary and Cape Verd Islands⁸

VERNACULAR NAMES

Burman; Ky-a-ve-khet, Can; Havala, Catalan; Corall, Coralloig., Duk; Gulli, English; Coral, Red coral, Noble coral, German; Koralliar, Gujrat; Parwala, Hindi; Parvara, Munga, Italy; Corallo, Konkan; Povalay, Malayalam; Pavalam, Marathi; Povalay, Persian; Marjana, Punjabi; Marjan, Sanskrit; Pravala, Vidruma, Sindh; Bubalo, Spanish; Coral rojo, Telugu; Pagadamu, Urdu; Marjan, Busud^{6,9,10}

BIOLOGICAL DESCRIPTION

Marjan belongs to phylum Cnidarians & family Coralliidae. It is rocky bottom species inhabiting a wide depth range from 7-200 m depth. Their shallowest depth range is in between 15 to 70 M growing in caves, crevices, overhangs and other protected interstices¹¹ *Marjan* is a slow growing (a few centimetres per year) and long living species. *Marjan* (*C. rubrum*), Diet based on small zooplankton organisms captured with the help of the polyps tentacles¹⁰

Macroscopic characters: *Marjan* appears to be a small shrub growing in a pendant or reverse position. It appears in slender, cylindrical, and generally branched pieces of brick red colour. It is composed of numerous minute pieces, each of which is furrowed minutely and longitudinally. It smells like frankincense. It easily breaks, generating a crackling sound. In its undeveloped state, the stems and branches have been covered with a cortical substance that is the habitation of soft small polyps¹²

Microscopic characters: An axial perspective of the skeleton presents a medullary zone surrounded by a circular area composed of concentric rings. These concentric rings are annual and reveal cyclic variations in organic matter and Magnesium/Calcium ratios; thus, both organic matter and Magnesium Calcium ratios can be used to date red coral colonies. Wavelets can be seen on growth rings. Each wavelet's internal structure is formed by combining layers with difficult interactions¹³.

Reproduction: *Marjan* is hermaphrodite, it have Sexual and asexual reproduction, Synchronized reproduction, Oviparous, viviparous, budding, fission and laceration, Egg, larva/planula and polyp phases, Separate sexes¹⁴

ORGANIC AND INORGANIC CONSTITUENTS

The skeleton of red *Marjan* contains primarily (around 85% of the wet weight) of calcium carbonate in the form of calcite. It also contains 5% other elements such as Mg, Fe, SO₄, P₂O₅, SiO₂, Pb, Zn,

and an organic matrix¹⁵. Carbonate, magnesium and iron⁴. Other constituents are magnesium (as MgO), Silica (as SiO₂), Phosphorus (as P₂O₃), Alumina (as Al₂O₃), Ferric Oxide (as Fe₂O₃), Sulphur (S), Potassium peroxide (K₂O) etc¹⁶.

Zoological classification

| | |
|------------|-------------------------|
| Kingdom | Animalia |
| Subkingdom | Radiata |
| Phylum | Cnidarians |
| Subphylum | Anthozoa |
| Class | Anthozoa |
| Subclass | Octacorallia |
| Order | Alcyonacea |
| Suborder | Scleraxonia |
| Family | Coralliidae |
| Genus | Corallium |
| Species | <i>Corallium rubrum</i> |

Scientific Name *Corallium rubrum* Linnaeus (Linnaeus 1758)

| | |
|----------------------------|--|
| Mijaz (Temperament) | <i>Sard Khusk</i> 2° ^{6,4} |
| Dose | 3-4 grain twice a day after meal ⁹ 60-120 mg ¹⁷ 250-300 mg ¹⁵ 125-250 mg ^{17,15} |
| Parts used | The calcareous shell or skeleton ⁹ |

Unani formulation: *Kushta-e-Marjan, Kusta-e-Busud, Kusta-e-Marjan Sada, Kusta-e-Marjan Jawahar wala*⁹

PHARMACOLOGICAL ACTIONS IN UNANI CLASSICAL LITERATURE

Daf-e-Humuzat (Antacid), *Daf-e-Balgham* (Phlegmatic), *Daf-e-Ishal* (Antidiarrheal), *Daf-e-Safra* (Ant bilious), *Daf-e-Samum* (Anti venom), *Habis* (Astringent), *Habis-ud-Dam* (Hemostatic), *Hazim* (Digestive), *Khafkon* (Palpitation), *Mudir-e-Boul* (Diuretic), *Mufarreh* (Exhilarant), *Mufarreh* (Stimulent), *Muhafiz-e-Hamal*, *Muhallil* (anti-inflammatory), *Mulaiyan* (Laxative), *Muqawwi* (Tonic), *Muqawwi-e-Basar* (Eye Tonic), *Muqawwi-e-Asab* (Nervine Tonic), *Muqawwi-e-Qalb* (Cardiac tonic), *Muqi* (Emetic), *Musammin* (Weight gainer), *Mushtahi* (Apetizer), *Muzaedemani*, *Qabiz* (Constipative), *Qula* (stomatitis), *Sara* (Epilepsy), Urinary antiseptic, *Wound healing*,^{4,5,6,9}

THERAPEUTIC USES IN UNANI CLASSICAL LITERATURE

Amraz-e-Boul (Urinary diseases), *Amraz-e-Meda* (Gastric disorder), *Amraz-e-Chashm* (Eye diseases), *Amraz-e-Safrawi* (Bilious diseases), *Bawaseer* (Piles), *Diq-e-Revi* (Pulmonary tuberculosis), *Falij* (Paralysis), *Faqad* (Impotency), *Hisatekuliya* (Renal calculi), *Humma* (Fever), *Humoozat-e-Medi* (Dyspepsia), *Insanity*, *Ishal-e-Khoon* (Malena), *Izmetehal* (Enlargement of spleen), *Jiryane-Mani* (Spermatorrhea), *Jiryane-Khoon* (Hemorrhage), *Jumra* (Carbuncle), *Juzam* (Leprosy), *Laqwa* (facial Paralysis), *Malankholiya* (Melancholia), *Nafas-ud-Dam* (Hemoptysis), *Nazla* (Catarrh), *Qai* (Vomiting), *Qula* (Stomatitis), *Ra'asha* (Tremors), *Sara* (Epilepsy), *Selan-ur-Reham* (Leucorrhoea), *Serofulous affection*, *Sidr* (Vertigo), *Sidra* (Giddiness), *Sil* (Phthisis), *Siqal-e-sama'at*, *Sual* (Cough), *Sudaa* (Headache), *Suzak* (Gonorrhoea), *Zaturriyah* (Pneumonia), *Zauf-e-Meda* (Weakness of stomach), *Zeequnnafs* (Asthma), *Ziyabetees* (Diabetes), *Zof-e-Badan* (General debility), *Zof-e-Ishaha* (Loss of appetite), *Zof-e-Aam* (General debility), *Zof-e-Qalb* (Cardiac debility), *Zukam* (Coryza).^{4,5,6}

PHARMACOLOGICAL STUDY

Antibacterial activity: Siddha formulation of *Marjan* (*Bussud*), *Pavalaparpam* was evaluated for its antibacterial activity in five bacterial strains by using disc diffusion method. The results showed

that Pavalaparpam has good antimicrobial activity at the dilution of 25 µl/disc against the bacterial strains such as *S. mutans*, *S. aureus*, *E. coli*, *K. pneumonia*, and *P. aeruginosa*¹⁹

Anti-osteoporotic activity: Reddy *et al*, study, the drug *Pravalabhasma* (*Kusta Marjan*) was evaluated for anti-osteoporotic activity in experimental rats. Progressive bone loss was induced in Female Sprague-Dawley rats by ovariectomy followed by low calcium diet. The drug treated group received *Kusta Majan* 65 mg/kg body weight, twice a day for 16 weeks. The level of calcium and phosphorus excreted in urine was comparatively decreased in the treated group. The decreased femoral weight and density were significantly reversed in animals treated with *Pravala (Busud) bhasma*. The cortical bone morphometric indices also revealed raised medullary width and cross-sectional area in treatment group. The combined cortical thickness and cortical and periosteal area ratio are also increased compared to sham operated animals. Scanning electron microscopy (SEM) study showed porous and erosive appearance of the distal femur at the epiphysis and reduced Ca/P ratio in ovariectomised animals was also reversed compared to RABBIT TEST (SHAM) and drug treated group.²⁰

Anti-atherosclerotic activity: The effect of consuming *Marjan* in Siddha medicine has been investigated on experimental atherosclerosis. Rabbits were fed a 0.5 percent cholesterol diet for six months to induce atherosclerosis. The animals were divided into various treatment groups. For the next six months, the therapy group received 50 mg of *Marjan* every day each animal. At the end of the experiment, plasma and aortic lipid components have been determined and atherosclerotic lesions in the aorta were quantified using histological techniques. Variations in metabolism of plasma and aortic phospholipids were studied by fractionation into individual lipids following the incorporation of radiolabel from ¹⁴C-acetate into phospholipids. The plasma cholesterol levels decreased by up to 65%, while the HDL level increased, Atheroma development was also inhibited. Anna pavala chendooram decreased plasma sphingomyelin levels 32, 33.^{21, 22}

Haemostatic activity: Thanigavelan study, the drug *Majan* powder was evaluated for haemostatic activity in Swiss albino mice. In acute toxicity study, the drug was found to be safe up to 2000 mg/kg body weight in Swiss albino mice. The animals were treated with 500 mg/kg body weight. When treated animals received *Pavala Parpam*, their blood showed a significant reduction in both bleeding and clotting time when compared with untreated control animals. There was also significant reduction in bleeding that was well comparable to that of standard adrenochrome a haemostatic drug.¹⁹

Hepato-protective activity: Velpandian, *et al*, study, the acute and 28 days repeated oral toxicity studies on Siddha formulation of *Marjan*, *Kodipavalachunnam* was carried out as per OECD guidelines. In acute toxicity study it was found that *Kodipavalachunnam* was found to be nontoxic upto 4000 mg/kg. Except for mild diarrhoea, *Kodipavala chunnam* did not cause intoxication in the animals when administered orally repeatedly. *Kodipavalachunnam* was evaluated for its hepato-protective activity in experimental rats. The haematological and biochemical measurements were used to evaluate liver damage. The animals treated with *Kodi Pavala Chunnam* showed near normal levels in haematological, biochemical parameters which indicate the hepato-protective activity of *Pavalam* against CCl₄ induced liver damage.²³ Siddha formulation of *Marjan*, the drug *Kodipavala chunnam* was evaluated for hepato-protective activity in patients with infective hepatitis, and drug induced hepatitis and alcoholic hepatitis. The drug was given to the patients at the dose of 100 to 200 mg thrice daily with honey for a period of 28 days. The levels of serum bilirubin, alkaline phosphate (ALP), Aspartate transaminase (AST), Serum alkaline phosphate (SAP) and Gama-Glutamin Transferase (GGT) were monitored before and after the treatment. The abnormal biochemical parameters of the liver were restored to normal levels with the application of *Kodi pavala chunnam*²³.

Anti-hyperacidity activity: Himanshu, *et al*, study in Siddha system of medicine two samples of *Pravala Mulabhasma* (*KustabikheMarjan*) (*Kusta* prepared from *Tubiphoramusica*) and two samples of *Shakh-e-Marjankusta* (*Kusta* prepared from *Coralliumrubrum*) were prepared and studied in patients with hyperacidity (*Humuzat-e-Medi*) for a period of 21 days. The cardinal and associated symptoms were carefully noticed and scored. Results of the study suggested that the effect of *KustaMarjan* was better than that of *KushaShakh-e-Marjan*.²⁴

CONCLUSION

Marjan (*Corallium rubrum*) is rich source of inorganic component; it is used in Ayurveda, Unani, Siddha, Homeopathy and ancient system of medicine, *Marjan* have been found many organic and inorganic component likes, Calcium carbonate in the form of calcite, Mg, Fe, SO₄, P₂O₅, SiO₂, Pb, Zn, Other constituents are magnesium (as MgO), Silica (as SiO₂), Phosphorus (as P₂O₃), Alumina (as Al₂O₃), Ferric Oxide (as Fe₂O₃), Sulphur (S), Potassium peroxide (K₂O) and an organic matrix, *Marjan* has been found to have antibacterial, anti-osteoporotic, anti-atherosclerotic, haemostatic, hepato-protective, and anti-hyperacidity properties, which could be useful in the medicinal, cosmetic, and other industries.

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